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Research Article

Discovery of a new *Tomocyrba* (Araneae, Salticidae, Hisponinae) and rediscovery of the type species from rainforests in northern Madagascar

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Abstract

The Malagasy endemic salticid genus *Tomocyrba* Simon, 1900 has had only a single contribution to its taxonomy in the last 120 years. Here, we report on a small collection of *Tomocyrba* from rainforests in the north- east of Madagascar. We describe one new species from Mahimborondro, *Tomocyrba ankihiberta* **sp. nov.** (♂♀) and provide a supplementary redescription of the type species *Tomocyrba decollata* Simon, 1901 based on the first fresh specimens collected in over 120 years.

Key words: Hisponine, jumping spider, Mahimborondro, Makira, Sofia, taxonomy

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Introduction

The salticid subfamily Hisponinae Simon, 1901 is well-supported with both molecular and morphological evidence (Szűts and Scharff 2009; Maddison 2015). The group is diagnosed by a constriction in the carapace just behind the posterior median eyes, first noticed in 1901 by Simon, to which Szűts and Scharff (2009) added the first metatarsus with one pair of spines or less. Maddison and Piascik (2014) then discovered the dual copulatory ducts of the epigyne that appear to be synapomorphic for the subfamily. From a phylogenetic standpoint, hisponines also rank as enigmatic, sitting as sister group to the generally globally dominant Salticinae (Bodner and Maddison 2012; Maddison 2015; Maddison et al. 2016) and being relatively common in fossils of Baltic Amber (Wunderlich 2004).

Tomocyrba was described by Simon in 1900 to contain two species from Antongil (Maroantsetra) and revised by Szűts & Scharff in 2009 to contain six species, of which four were described as new (see that paper for a comprehensive history of the composition and application of the genus name). In their paper, the two previously known species were redescribed based on historic type material, all more than 120 years old.

Two recent expeditions to northern Madagascar by the Biodiversity Inventory for Conservation (BINCO; www.binco.eu) and collaborators, one to

Mahimborondro in far northern Madagascar, and one to Makira natural park in the surroundings of Maroantsetra, yielded a small collection of adult *Tomocyrba*. The objective of this paper is to describe a new species from Mahimborondro, *T. ankihiberta* sp. nov. (♂♀) and provide a supplementary redescription of the type species *T. decollata* based on the first newly collected specimens in 120 years.

Materials and methods

All specimens were found and hand-collected during BINCO expeditions to the Mahimborondro protected area or Makira natural park. Specimens are preserved in 70% ethanol. Mahimborondro specimens were collected opportunistically (1L plastic soup pots, 10cm diameter, filled with diluted ethanol). Makira specimens were collected by dedicated active searches on shrubbery and leaf litter or with beating sheets. The left pedipalp of males is illustrated. Female epigynes were initially dissected using a custom made fine hooked needle, the epigynal plate was extricated by digesting the epigyne in warm potassium hydroxide (KOH) solution for 2–4 minutes before being observed in methyl salicylate. The epigyne was temporarily transferred onto a microscopic slide and structural components were observed with a compound microscope. Examinations were carried out using an AmScope ZM-4T stereomicroscope or a Leica MZ16. Habitus images were taken using a Visionary Digital BK Plus digital imaging system with a Canon EOS 5DSR with an MP-E 65mm macro lens, genitalia images were taken with a Leica DM3000 with a Leica MC190 HD camera attached. All images were z-stacked with between 10–20 images merged into a single photomontage using Helicon Focus 6.7 (www.heliconsoft.com). Images were adjusted in Adobe Photoshop version 21.0.1 for contrast and white balance. Leg measurements I–IV were carried out in the subsequent order: femur, patella, tibia, metatarsus, tarsus. All measurements were made in millimeters.

Abbreviations used in the text: AER, anterior eye row; AL, abdomen length; ALE, anterior lateral eyes; AME, anterior median eyes; AW, abdomen width; CD, copulatory ducts; CH, carapace height; CL, carapace length; CO, copulatory openings; CW, carapace width; FD, fertilisation ducts; ORW, ocular row width widest point; PER, posterior eye row; PLE, posterior lateral eyes; PME, posterior median eyes; RTA, retrolateral tibial apophysis; SL, sternum length. ST, spermatheca; SW, sternum width; TL, total length.

All newly generated type specimens will be deposited in the Royal Museum for Central Africa (RMCA, Tervuren). Collection numbers corresponding to permanent BINCO administered numbers are provided. Collection abbreviations used: RMCA- Royal Museum for Central Africa.

Results

Taxonomy

***Tomocyrba ankihiberta* Pett, sp. nov.**
https://zoobank.org/AD2E68E4-FFA1-470B-BF37-A3AA08834A53
Figs 1, 2, 5

Material examined. *Holotype* • ♂: MADAGASCAR: Sofia Province, Mahimborondro protected area (Réserve de Ressources Naturelles de Mahimborondro),

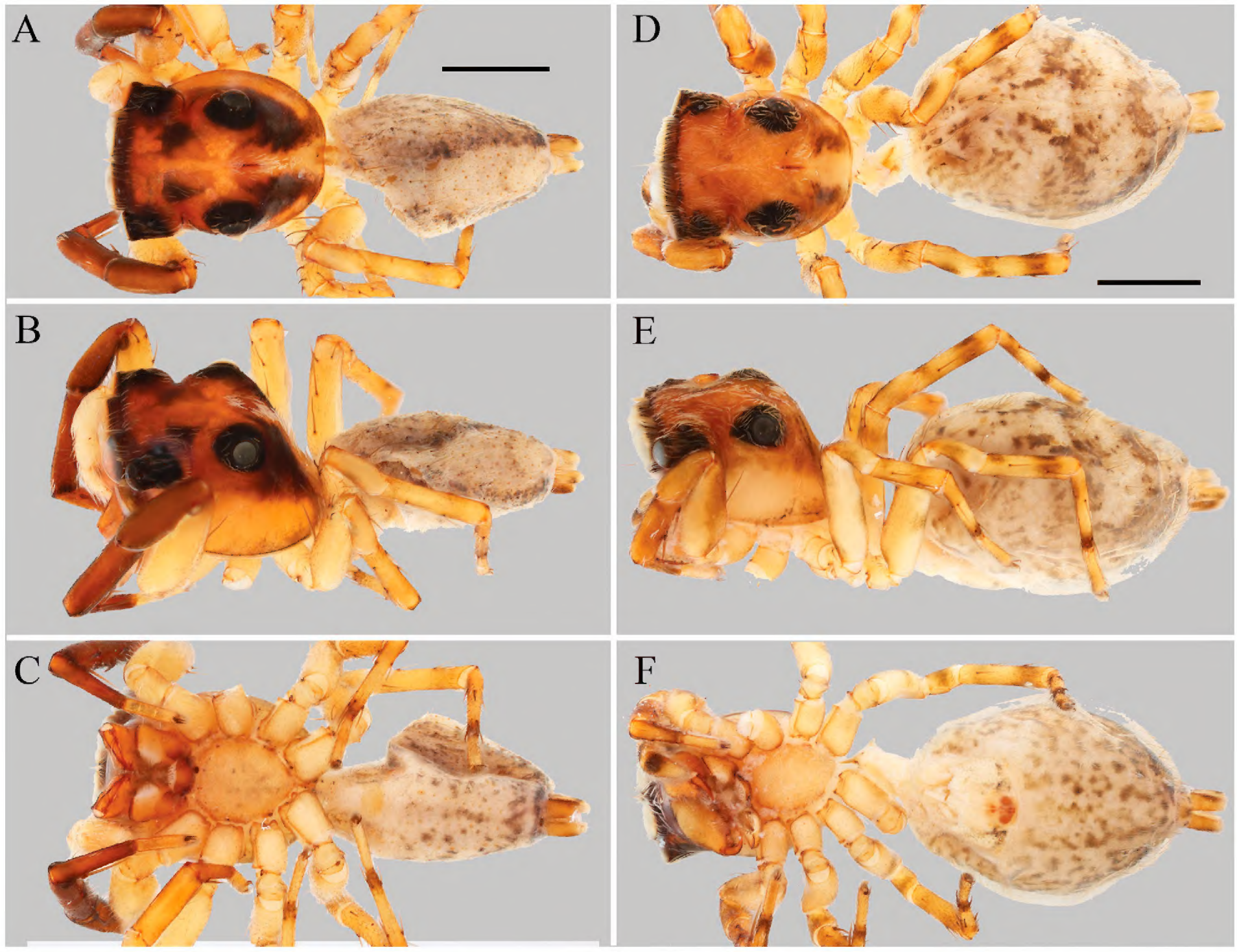

Figure 1. *Tomocyrba ankihiberta* sp. nov. habitus. **A–C.** Male; **D–F.** Female; **A, C.** Dorsal; **B, E.** Lateral; **C, F.** Ventral. Scale bars:1 mm.

14.300°S, 48.752°E, 1500 m, 29.i.2019–13.ii.2019, "Tropical rainforest", Merlijn Jocque et al. leg. (RMCA_ARA_ 247827/ BINCO_MAD_19_0086). ***Paratype*** • ♀: same data as holotype. (RMCA_ARA_ 247828/ BINCO_MAD_19_0086).

Diagnosis. *Tomocyrba ankihiberta* sp. nov. males could be distinguished from all known congeners by the barbed, slightly bent pointed embolus (Fig. 2A–D). Based on the serrated embolus it is the most similar to those of *T. barbata*, but can be distinguished by; (i) embolus straight, tapered to a sharp point and projected prolaterally for entire length (Fig. 2A, C) (vs. embolus curved retrolaterally for basal half, broad and without a tapered point in *T. barbata*), (ii) RTA thumb-like, short and rounded (Fig. 2B, D) (vs. RTA projected a short distance before curving back toward palp, with thin sharp point in *T. barbata*). Female epigynes are most similar to those of *T. berniae* Szűts & Scharff, 2009 in sharing long and mostly straight CD, but those of *T. ankihiberta* sp. nov. are distinguished by the two CO (vs. one) and by chamber walls of ST that are paddle- shaped and chambered rather than undulating and tube- like.

Etymology. The specific epithet is a noun in apposition. It is derived from the amalgamation of the Malagasy word "ankihibe" (meaning thumb) and RTA (retrolateral tibial apophysis), reference is made to the thumb- shaped RTA of the male.

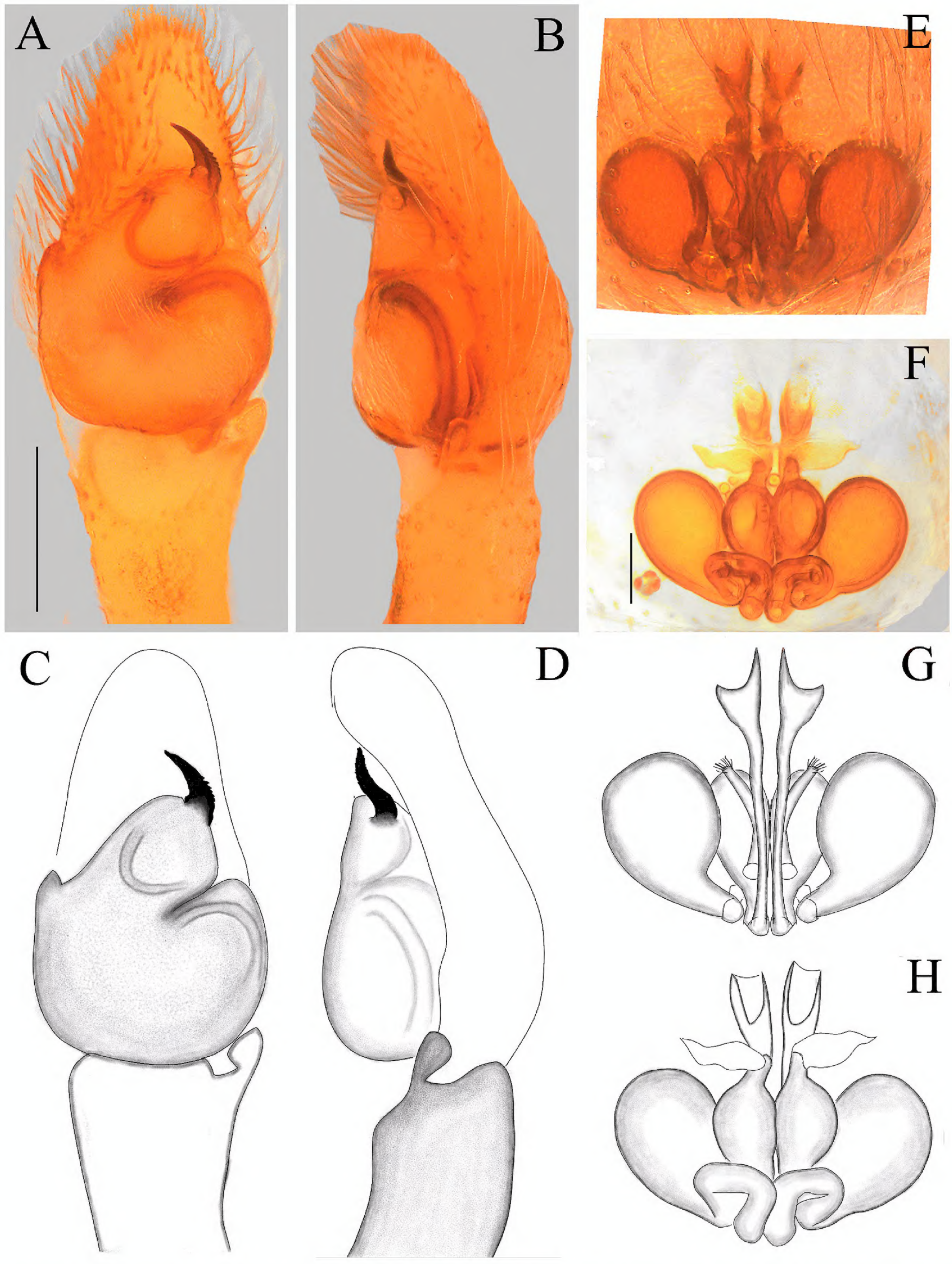

Figure 2. *Tomocyrba ankihiberta* sp. nov. genitalia. **A–D.** Male pedipalp; **E–H.** Cleared epigyne. **A, C, E, G.** Ventral view; **B, D.** Retrolateral view; **D, H.** Dorsal view. Scale bars: 0.5 mm.

Description. Male. Measurements. TL 3.74, CL 1.80, CW 1.44, AL 1.94, AW 1.28, SL 0.88, SW 0.68. Leg measurements: I: 1.32, 0.76, 0.96, 0.68, 0.46. II: 1.04, 0.56, 0.80, 0.68, 0.36. III: 1.08, 0.42, 0.60, 0.76, 0.44. IV: 1.20, 0.48, 0.82, 0.96, 0.44. ALE 0.22, AME 0.4, PME 0.07, PLE 0.22.

***Colouration*:** carapace generally light orangish brown, eyes ringed with black, dark brown patches posterior to PLE, pale streak from fovea to posterior margin; chelicerae orangish; sternum, labium, maxillae, coxae and legs all generally pale beige, patellae, tibiae, and metatarsi I dark brown; abdomen grey with some black mottling; pedipalp cream to beige.

***Carapace*:** very high, highest at PLE, clear depression midway between lateral eyes; sparse short setae just posterior to fovea.

***Sternum*:** broadly shield- shaped, widest between coxae I & II.

***Legs*:** Legs I & II much broader.

***Abdomen*:** oval, about twice as long as wide.

***Pedipalp*:** femur slightly longer than patella and tibia together, patella and tibia about the same length; RTA thumb- like, short and rounded; SD arises medially and loops around tegulum for half its length; embolus moderately short and straight, directed prolaterally tapering to sharp point.

***Leg spination*:** (taken from right side as left leg II missing) I: F d3 pl1, Ti v2-1, Mt v1-1; II: F d3 pl, Ti v2-2, Mt v2-2.

Female. Measurements. TL 4.32, CL 1.76, CW 1.36, CH 1.16, SL 0.84, SW 0.64, AL 2.56, AW 1.80, chelicera length 0.76, chelicera width 0.42. Legs (taken from right as left III missing). I: 1.08, 0.60, 0.76, 0.52, 0.40. II: 0.98, 0.48, 0.56, 0.48, 0.36. III: 1.08, 0.40, 0.60, 0.64, 0.44. IV: 1.04, 0.56, 0.82, 0.84, 0.50. Eyes: AME – 0.41, ALE – 0.24, PME – 0.06, PLE – 0.30.

General colouration, pattern and somatic morphology the same as in male. Except; carapace slightly lighter, dark patch behind PME lighter, pale band wider, much denser brown mottling on abdomen; female palp with dense field of short erect setae prolaterally.

***Leg spination*:** I: F d3 pl1, Ti v2-2, Mt 1-1. II: F d3 pl1, Ti v2-2, Mt 1-1.

***Epigyne*:** epigynal region longer than wide by about 1.5×; COs at anterior margin directed anteriorly, CD long and thin, directed straight posteriorly, suboval ST moderately large, separated by about half their width; glandular ducts moderately long and thin, arising ventrally on ST.

Tomocyrba decollata Simon, 1900

Figs 3–5

Tomocyrba decollata Simon (1900): 388, Simon (1901): 440–442, figs 493–495; Roewer (1965): 81, figs 72, 73a; Szűts and Scharff (2009): 1345, figs 1A, 2A, C, 3A, B, 6A, 7A, 8A–H; Prószyński (2017): 112, fig. 49E.

Type material. ***Lectotype*** • ♂ MADAGASCAR: Antongil, Mocquerys leg. (MNHNP No. 20952/a); ***Paralectotypes*** • ♂ ♀ MADAGASCAR: same collection information (MNHNP No. 20952/b). Not examined.

Material examined. • 2♂♂1♀ MADAGASCAR: Toamasina Province, Makira Natural Park, 09–12.ix.2023, 15°4'15"S, 49°34'48"E, Brogan L. Pett leg. (RMCA_ ARA_ 247829).

Remarks. This species was redescribed from the syntype series by Szűts and Scharff (2009). The material in question was more than 120 years old with completely bleached specimens. The female vulva was not prepared but examined making the whole abdomen temporary transparent with wintergreen oil

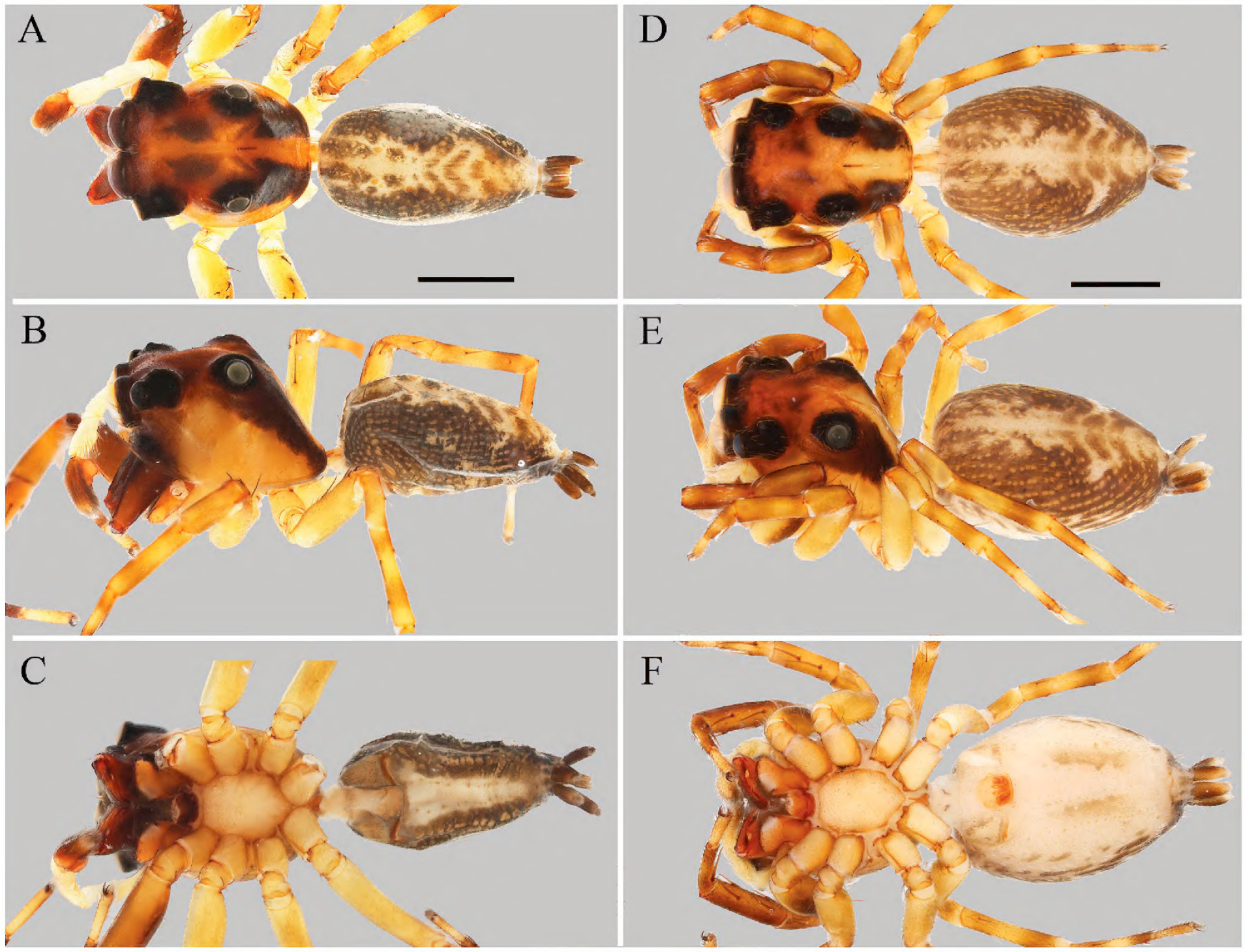

Figure 3. *Tomocyrba decollata* habitus. **A–C.** Male; **D–F.** Female; **A, C.** Dorsal; **B, E.** Lateral; **C, F.** Ventral. Scale bars: 1 mm.

(methyl salicylate) – Szűts pers. comm. The material presented here is therefore the first records of this species in 120 years, and this is the first illustration of the internal structure of the species' epigyne. As such, we provide a through redescription based on fresh material from the same region and possibly only around 30 km away from the type locality (exact location of "Antongil" not confirmed but probably the port city of Maroantsetra, adjacent to Antongil Bay).

Diagnosis. Males are easily recognised by the very short undulating embolus (Fig. 4A, C) and broad evenly rounded RTA (Fig. 4B, D), and females by the epigyne much broader than long (Fig. 4E–H), with short CD running posterior from CO.

Redescription. Male. TL 4.40, CL 2.06, CW 1.48, CH 1.36, SL 0.84, SW 0.70, AL 2.34, AW 1.18, chelicera length 0.80, chelicera width 0.30. Legs (all taken from right). I: 1.48, 0.82, 1.34, 0.96, 0.56. II: 1.20, 0.60, 1.02, 0.76, 0.42. III: 1.42, 0.48, 0.94, 1.16, 0.44. IV: 1.50, 0.56, 1.16, 1.28, 0.56. Eyes: AME – 0.48, ALE – 0.24, PME – 0.09, PLE – 0.22.

***Leg spination*:** I: d3 pl1, Ti v2-2, Mt v1-1; II: Ti v1-2, Mt v1-1.

***Colouration*:** carapace generally light orangish brown, eyes ringed with black, dark brown patches posterior to PLE; chelicerae orangish; sternum, labium, maxillae, coxae and legs all generally pale beige, patellae, tibiae, and metatarsi I dark brown; abdomen grey to brown with substantial amounts of black mottling, especially laterally, several small dark chevrons posteriorly; pedipalp cream to beige.

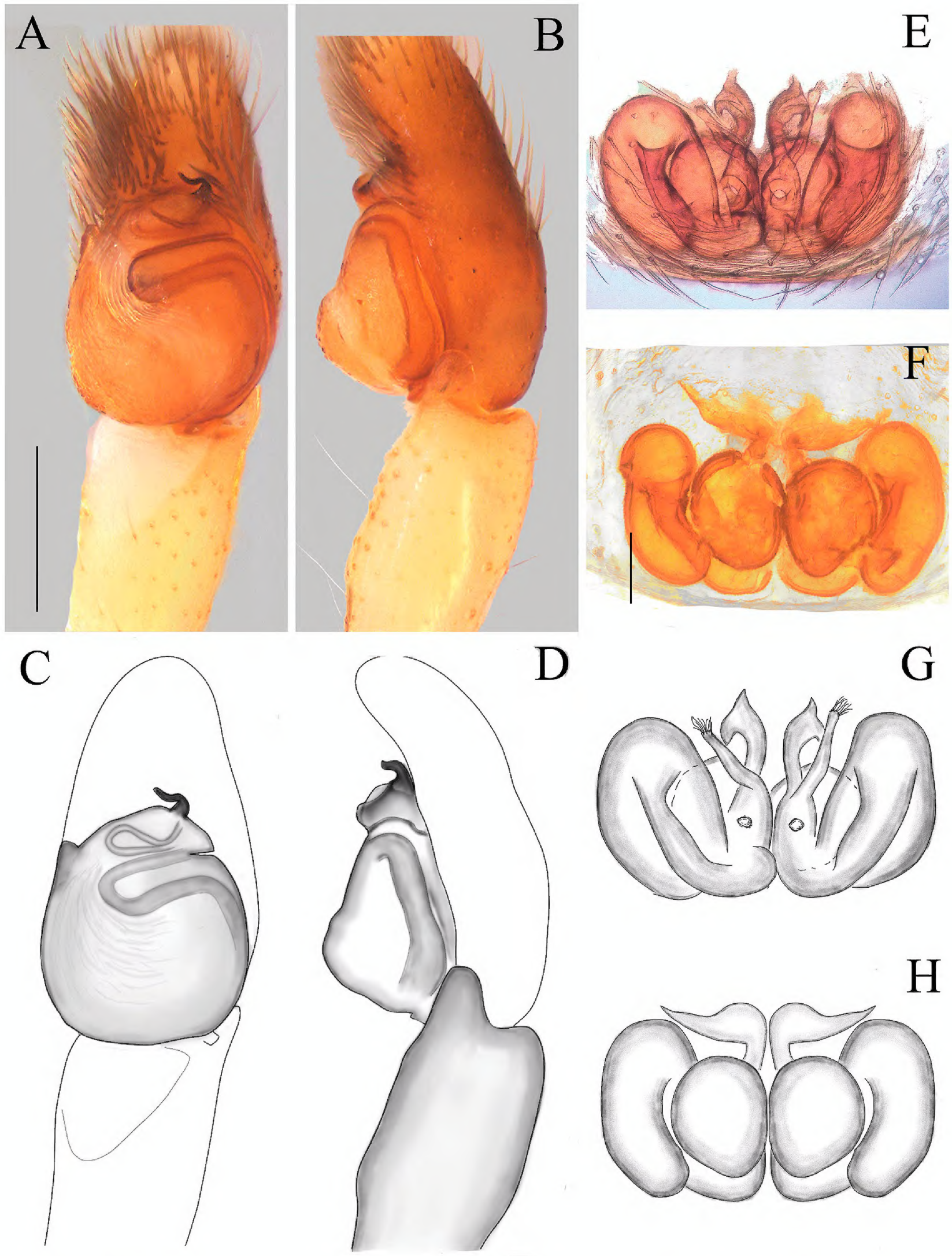

Figure 4. *Tomocyrba decollata* genitalia. **A–D.** Male pedipalp; **E–H.** Cleared epigyne. **A, C, E, G.** Ventral view; **B, D.** Retrolateral view; **D, H.** Dorsal view. Scale bars: 0.5 mm.

***Carapace*:** very high, highest at PLE, clear depression midway between lateral eyes; sparse short setae just posterior to fovea.

***Sternum*:** broadly shield- shaped, widest at line of coxae III.

***Legs*:** Legs I & II much broader.

***Chelicerae*:** Promargin with nine teeth, distal two and second to basal tooth much larger than others, teeth 3–5 (from basal) reduced to small denticles, retromargin with one comb- like tooth with seven small denticles.

Figure 5. Localities of specimens cited in this study. Made with simplemappr (Short-house 2010).

***Abdomen*:** oval, about twice as long as wide.

***Pedipalp*:** femur slightly longer than patella and tibia together, patella and tibia about the same length; RTA about half width of tibia, short broad and evenly rounded; SD arises medially and loops around tegulum for half its length; embolus arising on retrolateral apical part of tegulum, very short and strongly undulating prolaterally.

Female. TL 4.12, CL 1.84, CW 1.40, CH 1.28, SL 0.88, SW 0.64, AL 2.28, AW 1.60, chelicera length 0.60, chelicera width 0.36. Legs. I: 1.04, 0.72, 0.88, 0.64, 0.64. II: 1.00, 0.64, 0.74, 0.64, 0.42. III: 1.24, 0.60, 0.88, 0.92, 0.48. IV: 1.40, 0.60, 1.10, 1.12, 0.56. Eyes: AME – 0.48, ALE – 0.23, PME – 0.09, PLE – 0.30.

***Leg spination*:** I: F d3 pl1, Ti v2-2, Mt v1-1; II: Ti v2-2, Mt v1-1.

Somatic characters and colouration the same as in male, except: carapace with deep fovea, slightly paler abdomen, retromargin with one comb- like tooth with eight small denticles.

***Epigyne*:** Rectangular, 1.5× wider than long, CO anteromedially situated, CD running posteriorly in a sinuous line, accessory gland duct runs from just outside

the line of CD posteromedially to connect at posterior part of CD before the large swollen anterolateral loops of CD, anterolateral loops generally a lower- case soft N- shape, CD then connect to reasonably large kidney- bean- shaped median ST, FD arise anteromedially from short stalks and are directed straight laterally.

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Additional information

Conflict of interest

The authors have declared that no competing interests exist.

Ethical statement

No ethical statement was reported.

Use of AI

No use of AI was reported.

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Author contributions

BLP identified and diagnosed specimens, KM made the drawings, BLP imaged specimens, both created plates. BLP collected specimens. BLP wrote the first draft of the manuscript and edited the revised manuscript. BLP & KM both contributed to the text.

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Data availability

All of the data that support the findings of this study are available in the main text.

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